

Chapter 18 A low and stable rate of inflation

(CC Pg 236-238; S&P Pg 121-122)

Inflation: The persistent increase in the average price level in the economy, usually measured through the calculation of consumer price index (CPI).

Calculating inflation:

- Usually economists use **commodity price indices** and **consumer price indices (CPI)**.
- A **weighted price index** takes the basket of products and the products are then given a different weight based upon the relative amount that people spend on them.

$$\text{Inflation rate} = \frac{\text{Index for } (X+1) - \text{Index for } X}{\text{Index for } X} \times 100$$

Examples:

Country A

Category	Index for year X	Weight (%)	Index (Year X times weight)	Index for year (X+1)	Index for Year (X+1) x Weight
Housing	120	40	48	130	52
Food	105	20	21	105	21
Travel	120	10	12	125	12.5
Clothing	120	20	24	110	22
Entertainment	125	10	12.5	130	13
Totals		100%	117.5		120.5

- Plug the numbers into the equation

$$\begin{aligned}\text{Inflation rate} &= \frac{120.5 - 117.5}{117.5} \times 100 \\ &= 2.55\%\end{aligned}$$

- Normally, the weighted inflation rate would be larger than the unweighted rate. This is because the increase in the price of one basket (for example the most important expenditure) is given its proper importance and is not cancelled out by the fall in the price of less important expenditures.

HL Paper 3 Questions

Year	Price of good X	Price of good Y	Price of good Z
2012	\$8.00	\$0.60	\$2.00
2013	\$8.40	\$0.64	\$2.05
2014	\$8.60	\$0.75	\$2.25

The basket of the typical consumer contains 10 units of good X, 20 units of good Y, and 30 units of good Z.

1. Construct a weighted price index for all three years assuming 2012 is the base year.

- Calculate the cost of each basket each year. The price of each product in each year is multiplied by the quantity purchased in the base year (2012).

Year	Cost of basket
2012	$\$8 \times 10 + \$0.6 \times 20 + \$2 \times 30 = \152.50
2013	$\$8.40 \times 10 + \$0.64 \times 20 + \$2.05 \times 30 = \158.30
2014	$\$8.60 \times 10 + \$0.75 \times 20 + \$2.25 \times 30 = \168.50

- Construct a weighted price index for any year X you need to divide the cost of the basket in year X by the cost of the basket in the base period (2012) and multiply by 100.

$$\text{Price Index} = \frac{\text{Cost of basket in year X}}{\text{Cost of basket in base year}} \times 100$$

Year		Price index	
	2012	152.50 / 152.50 x 100 = 100	100
	2013	158.30 / 152.50 x 100 = 103.80	103.80
	2014	168.50 / 152.50 x 100 = 110.49	110.49

2. Calculate the inflation rate for 2013 and 2014.

2013

$$\text{Inflation rate} = \frac{103.80 - 100.00}{100.00} \times 100$$

$$= 3.80\%$$

2014

$$\text{Inflation rate} = \frac{110.49 - 103.80}{103.80} \times 100$$

$$= 6.45\%$$

Summary

In the case of consumer price indices the weighting is the expenditure on it expressed as a proportion of total expenditures made.

- There would be reference/base year and all other years are expressed as percentage of it.
- Price index of the base year is normally 100

More Practice

Category	2015	2016
Housing	110	120
Trasport	106	110
Food	120	120
Entertainment	110	100
Clothing	105	105

1. Calculate the unweighted inflation rate for 2015 and 2016.

2. According to the survey, the average household spends 35% of income on housing, 25% on transport, 15% on food, 15% on entertainment, and 10% on clothing. Assuming the consumer expenditure patterns remain for 2015 and 2016, find the weighted indices for two years.

3. Explain the differences between the inflation rates you have calculated in 1 and 2. Explain with the importance of weighting.

Chapter 26 Terms of Trade

(CC Pg 317-318; S&P Pg 166-168)

Mathematically, the Terms of Trade is an index that shows the value of a country's average export prices relative to their average import prices. It reflects the rate at which one country's goods exchange for those of another country.

$$\text{Terms of Trade (TOT)} = \frac{\text{Weighted index of average export prices}}{\text{Weighted index of average import prices}} \times 100$$

- When there is an improvement in the TOT. For example, it rises from 100 to 102, it could be said that on average, the country's exports will now buy 2% more imports than they did in the previous year.
- An deterioration in TOT means that a given amount of exports can buy fewer imports than in the previous year.

**** If the TOT improve, then a given quantity of exports will buy a larger quantity of imports than before. If the price of a basket of exports falls, then a country will need to sell more exports to keep imports at the same level. *****

HL Paper 3 Questions

Country A mainly exports coffee, and it only imports machinery.

Year	P coffee (\$/ton)	P coffee (index)	P machine (\$/ton)	P machine (index)	X revenues (\$ billions)
2007	1756		24890		1.01
2008	1653		25500		0.98
2009	1624		26358		0.97
2010	1589		26598		0.96

1. If 2007 is the base year, convert export and import prices into index numbers. (complete the table)

Year	P coffee (\$/ton)	P coffee (index)	P machine (\$/ton)	P machine (index)	X revenues (\$ billions)
2007	1756	$1756/1756 \times 100 = 100$	24890	$24890 / 24890 \times 100 = 100$	1.01
2008	1653	$1653 / 1756 \times 100 = 94.13$	25500	$25500 / 24890 \times 100 = 102.45$	0.98
2009	1624	$1624 / 1756 \times 100 = 92.48$	26358	$26358 / 24890 \times 100 = 105.90$	0.97
2010	1589	$1589 / 1756 \times 100 = 90.49$	26598	$26358 / 24890 \times 100 = 105.90$	0.96

- To convert into index numbers, we divide the export prices in each year by the export price prevailing in 2007 and multiply by 100.

2. Calculate TOT of country A

$$2007 \quad \frac{100}{100} \times 100 = 100$$

$$2008 \quad \frac{94.13}{102.45} \times 100 = 91.88$$

$$2009 \quad \frac{92.48}{105.90} \times 100 = 87.33$$

$$2010 \quad \frac{90.49}{106.86} \times 100 = 84.68$$

Using Percentage Change to calculate...

- Real GDP using a price deflator

In economics, the GDP deflator (implicit price deflator) is a measure of the level of prices of all new, domestically produced, final goods and services in an economy.

You would most likely be provided with 3 pieces of info:

1. Initial GDP -> Country X GDP 2015: 1 Trillion
2. Final GDP -> Country X GDP 2016: 1.2 Trillion
3. Price Deflator ->% Inflation rate between 2014-2015: 3%

$$\text{Price deflator is essentially} = \frac{\text{Base Year Inflation}}{\text{Base Year Inflation} + \text{Inflation rate}} \\ = \frac{100}{100 + \text{Inflation rate}}$$

Question: What is the real GDP now?

Equation to calculate real GDP = Current Nominal GDP x Price Deflator

Essentially, It becomes 1.2 Trillion x $\frac{100}{100+3} = \mathbf{1.17 \text{ Trillion}}$

- Rate of Economic Growth

You would most likely be provided with 2 pieces of info:

1. Real GDP in Year 2 -> 3 trillion
2. Real GDP in Year 1 -> 2 trillion

Question: What is Growth Rate?

$$\text{Growth Rate} = \frac{\text{Real GDP in Year 2} - \text{Real GDP in Year 1}}{\text{Real GDP in Year 1}} = \frac{3 \text{ trillion} - 2 \text{ trillion}}{2 \text{ trillion}} = \mathbf{50\% \text{ Growth}}$$

Calculation of % change: Elasticity

1. Price elasticity of demand [PED]

Price elasticity of demand is a measure of how much the quantity demanded of a product changes when there is a change in the price of the product. When calculating PED, we use the following equation:

$$PED = \frac{\text{Percentage change in quantity demanded of the product}}{\text{Percentage change in price of the product}}$$

Example:

A publishing firm discovers that when they lower the price of one of their monthly magazines from \$5 to \$4.50, the number of magazines that are bought by customers each month rises from 200,000 to 230,000. With this information, we can calculate the price elasticity of demand for the magazine in question.

1. Calculate percentage change in quantity demanded of the product

$$\frac{\text{final price} - \text{original price}}{\text{original price}} \times 100\% = \frac{\$4.50 - \$5.00}{\$5.00} \times 100\% = -10\%$$

2. Calculate percentage change in change in price of product

$$\frac{\text{final quantity demanded} - \text{original quantity demanded}}{\text{original quantity demanded}} \times 100\% = \frac{230000 - 200000}{200000} \times 100\% = 15\%$$

3. Plug the numbers in

$$PED = \frac{\text{Percentage change in quantity demanded of the product}}{\text{Percentage change in price of the product}} = \frac{15\%}{-10\%} = -1.5$$

2. Cross elasticity of demand [XED]

Cross elasticity of demand is a measure of how much the demand for a product changes when there is a change in the price of another product. When calculating PED, we use the following equation:

$$XED = \frac{\text{Percentage change in quantity demanded of product X}}{\text{Percentage change in price of product Y}}$$

When determining percentage change in quantity demanded and percentage change in price, we use same equations used in PED:

$$\begin{aligned}\text{percentage change in price} &= \frac{\text{final price} - \text{original price}}{\text{original price}} \times 100\% \\ \text{percentage change in quantity} &= \frac{\text{final quantity} - \text{original quantity}}{\text{original quantity}} \times 100\%\end{aligned}$$

3. Income elasticity of demand [YED]

Income elasticity of demand is a measure of how much the demand for a product changes when there is a change in the consumer's income. When calculating YED, we use the following equation:

$$YED = \frac{\text{Percentage change in quantity demanded the product}}{\text{Percentage change in income of the consumer}}$$

When determining percentage change in quantity demanded and percentage change in income, we use these equations:

$$\begin{aligned}\text{percentage change in quantity} &= \frac{\text{final quantity} - \text{original quantity}}{\text{original quantity}} \times 100\% \\ \text{percentage change in income} &= \frac{\text{final income} - \text{original income}}{\text{original income}} \times 100\%\end{aligned}$$

4. Price elasticity of supply [PES]

Price elasticity of supply is a measure of how much the supply of a product changes when there is a change in the price of the product. When calculating PES, we use the following equation:

$$PES = \frac{\text{Percentage change in quantity supplied of the product}}{\text{Percentage change in price of the product}}$$

When determining percentage change in quantity supplied and percentage change in price, we use same equations used in PED:

$$\begin{aligned}\text{percentage change in price} &= \frac{\text{final price} - \text{original price}}{\text{original price}} \times 100\% \\ \text{percentage change in quantity} &= \frac{\text{final quantity} - \text{original quantity}}{\text{original quantity}} \times 100\%\end{aligned}$$

5. Price elasticity of demand for exports

Price elasticity of demand for exports is a measure of the responsiveness of the demand for exports when there is a change in the price of exports. When calculating PED_{exports} , we use the following equation:

$$PED_{\text{exports}} = \frac{\text{Percentage change in demand for exports}}{\text{Percentage change in average price of exports}}$$

6. Price elasticity of demand for imports

Price elasticity of demand for imports is a measure of the responsiveness of the demand for imports when there is a change in the price of imports. When calculating PED_{imports} , we use the following equation:

$$PED_{\text{imports}} = \frac{\text{Percentage change in demand for imports}}{\text{Percentage change in average price of imports}}$$